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German Patent No. 1 075 997
(Auslegeschrift)

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DAS 1 075 997
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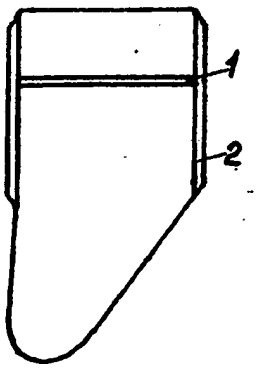

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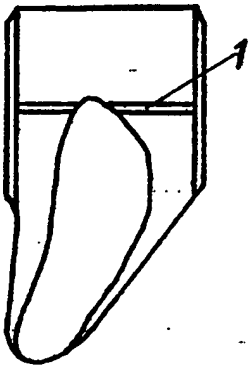

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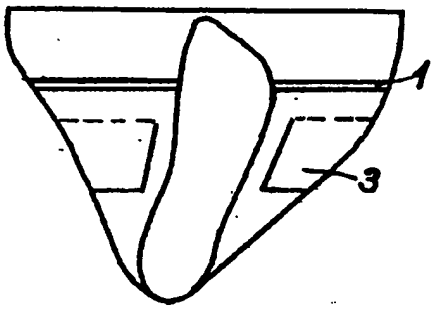

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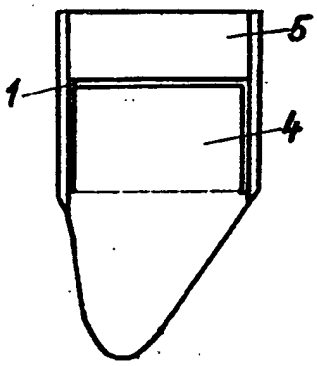

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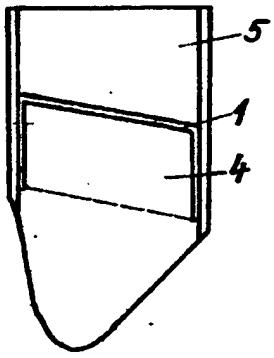

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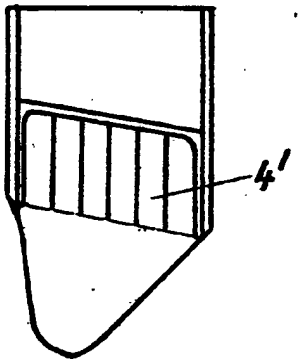

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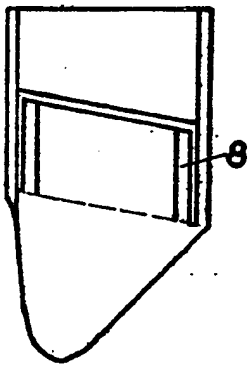

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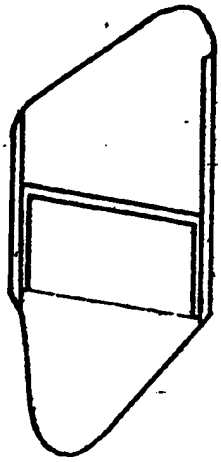

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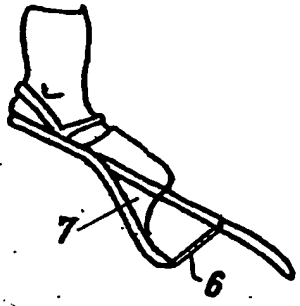

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FEDERAL REPUBLIC OF GERMANY
GERMAN PATENT OFFICE
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SWIMMING FINS TO BE ATTACHED TO THE FEET

Inventor:	Ernst Langhans, Hamburg-Wandsbek
Applicant:	Ernst Langhans, Hamburg-Wandsbek, Kurvenstr. 33

Because the human body is inherently unsuitable for swimming and the powerful leg and back muscles can be used only incompletely and indirectly for the swimming movement, there has been no absence of attempts to eliminate this deficiency, wherein the surface area of the sole of the foot has been enlarged by devices so that they will take up a water pressure corresponding to the force of the leg and in this manner generate a more powerful propulsion force. This invention pertains to just this kind of device, which consists of a swimming fin to be attached to the foot and that is secured to the foot with belts or bands.

A large number of such swimming devices are already known. We can mention flaps, articulated about hinges, which spread apart with or without spring force, or fans which deploy under the water pressure. Finally, included herein are the rubber or plastic Hass-fins whose front tips bend, due to their elasticity, during movement of the leg, depending on whether the water pressure arrives from above or from below.

While the pressure surface comes fully into play with these fins during kicking of the legs, the reduced pressure under the surface when drawing in the legs will cause considerable braking resistance due to the suction effect, which partially negates the valuable propulsion force

when kicking the leg backward. In addition, this kind of fin cannot make sufficient use of the muscle power inherent in the leg, since it cannot exceed a particular size. These fins do not satisfy hydrodynamic requirements with regard to utilizing the leg forces and achieving the greatest possible efficiency.

These disadvantages are to be corrected by the invention, in particular in that the reduced pressure under the fins is to be eliminated when drawing in the legs, and at the same time, the pressure effect on the fins is to be improved. Thus, the objective is to use one and the same surface as a pressure surface on the one hand, and on the other hand, as a reduced pressure surface, and to make use of the mutually contradictory requirements in an advantageous manner.

This objective is achieved primarily by means of a nozzle-shaped gap in the fin surface that is located transverse to the longitudinal direction of the swimming fin and is bounded on the side by its edge strips. Preferably, this gap is located in the region of the toes or somewhat in front, or possibly also below or next to the sole of the foot. Thus, from the pressure side, water moves against the suction side and flushes away the dead space created at the suction side. Thus, a "circulation" forms around the front, flat part which has an inflow transverse to the fin motion and produces a propulsion force roughly like that of a ship propeller.

Embodiments of the invention are presented in schematic illustrations in Figures 1-9. In these, attachment of the fins and other individual parts of no importance to explanation of the invention have been left out.

Figure 1 shows a swimming fin with a gap 1, located transversely to its longitudinal direction, which extends laterally out to the edge strips 2. Of course, the gap can also be placed at a slant; it can be located in front of or even behind the toes, as Figure 2 shows; but it can also be located directly below or in the sole of the foot, as indicated in Figure 3. The lateral surfaces produced in this case can then have stand-alone flaps 3—acting on one or both sides—or supplemental impact fins, in order to eliminate dead space below the surface of the fin. In Figure 4, the gap 1 is extended backward along the edge strip 2. Thus a tongue is formed which moves the stroke fin part 4 so that with every change in impact direction, the deflection is changed and thus a gap flow is produced at the front surface, designated as the guide fin part 5, that can be greater than for a simple gap. In Figure 5, the gap 1 of this tongue is placed slantwise to the fin's longitudinal direction in order to have room for the placement of the foot, and in Figure 6, the stroke fin part is broken down into individual louvers 4' that are located parallel to the direction of flow. In Figure 7, the stroke fin part itself has lateral edge strips 8. In Figure 8, a fin is presented that has a roughly trapezoidal outer shape. Finally, in Figure 9, we can see how the downward curved stroke fin part is held by bands 6 and the space below the sole of the foot is filled by an elastic flow-promoting guide 7.

With respect to the natural placement of the foot and to its force effect along the toes to the heel bone, the foot can be located at something of a slant relative to the longitudinal midline of the fin, as is illustrated in Figures 2 and 3, for example. But in addition, when viewed in the stroke direction, the fin can also form a small angle to the sole of the foot, so that the fin will fall roughly in the direction of the tibia, as if in Figure 9 the fin falls in the direction of the illustrated stroke fin part.

The guide fin part is generally rigid except for the tip, which can be somewhat flexible. The fin structure is securely attached to the foot mounting. It has a contoured cross section, and in addition, the stroke fin part has a sharp edge at its tip. The impact and guide fin parts can also have any other outline form, e.g., that of a triangle, of a trapezoid, of a semicircle or that of a fish tail or similar shape, the latter with or without a zigzag edge. The size of the fin is adapted to the foot or leg force in correspondence with practical requirements. For walking on land, the front guide fin part can be of removable design.

The edge strips are designed to be high enough so that flow cannot occur from the pressure side to the intake side. Any additionally-supplied reinforcing ribs are also placed in the direction of relative flow.

The fins are attached to the feet in the known manner by leather or rubber belts, by tie bands or rubber suction and similar devices. Also, the entire swimming device can be placed in a shoe, where the toe or heel part can be cut away. In order to make use of the leg force to accelerate the swimming motion and not solely for the mass motion of the fin, the fin will be constructed to be as light as possible; instead of relatively heavy rubber, we can use fiberglass-reinforced plastics or the like, including fabrics that can be pulled over a frame, as a type of lightweight construction.

Claims

1. Swimming fin which consists of a swimming surface extending out forward beyond the toes, reinforced with edge strips and possibly also with reinforcing ribs, and attached to the foot with belts or bands, characterized in that the fin surface has a nozzle-shaped gap (1) transverse to the longitudinal direction of the swimming fin, said gap being bounded on the side by the edge strips (2).

2. Swimming fin according to Claim 1, characterized in that the nozzle-shaped gap (1) is located in the region of the toes or somewhat in front.

3. Swimming fin according to Claim 1, characterized in that the nozzle-shaped gap (1) is located below or beside the sole of the foot.

4. Swimming fin according to Claims 1 to 3, characterized in that to form a stroke fin part (4) located within the fin surface which is acted on by the flow pressure, the transverse gap (1) is extended backward at its ends in the longitudinal direction of the fin.

5. Swimming fin according to Claims 1 to 4, characterized in that the gap (1), located between the stroke fin part (4) and the front part (5) of the swimming fin acting as guide fin, is positioned diagonally to the fin's longitudinal direction.

6. Swimming fin according to Claims 1 to 5, characterized in that in the fin surface extending out to the heel of the foot, supplemental impact fins (3) are provided on both sides of the foot.

7. Swimming fin according to Claims 1 to 6, characterized in that the deflection of the stroke fin part (4) is limited by bands (6) or stops.

8. Swimming fin according to Claims 1 to 7, characterized in that the dead space forming between the sole of the foot and the stroke fin part (4) is filled by an elastic, flow-promoting guide (7).

9. Swimming fin according to Claims 1 to 8, characterized in that the stroke fin part is divided into several louvers (4') located in the direction of flow.

10. Swimming fin according to Claims 1 to 8, characterized in that the stroke fin part (4) has one reinforcing strip (8) extending above and below the fin thickness.

11. Swimming fin according to Claims 1 to 10, characterized in that the surface of the swimming fin forms an angle with the surface of the sole of the foot, said angle roughly corresponding to that formed, with the foot extended, between the sole of the foot and the imagined longitudinal axis of the lower leg.

12. Swimming fin according to Claims 1 to 11, characterized in that the axis of the swimming fin located in the direction of flow forms an angle with the longitudinal direction of the foot.

13. Swimming fin according to Claims 1 to 12, characterized in that the guide fin part (5) is elastically flexible at the front end.

14. Swimming fin according to Claims 1 to 13, characterized in that the guide fin part (5) is of removable design.

15. Swimming fin according to Claims 1 to 14, characterized in that the front edge of the guide fin part (5) lies at a slant to the swimming fin longitudinal direction and terminates in a lateral tip.

16. Swimming fin according to Claims 1 to 15, characterized in that stroke fin part (4) and guide fin part (5) have an arbitrary shape other than a square or trapezoid.

Publications taken into consideration:

German Patent specification No. 11 957
German Utility Model No. 1 678 443
Swiss Patent specification No. 254 269
French Patent specification No. 935 222
British Patent specification No. 387 247